

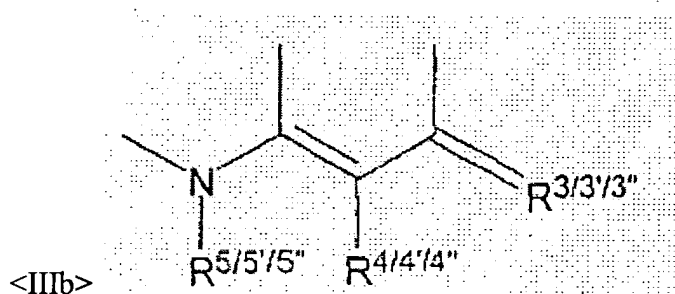
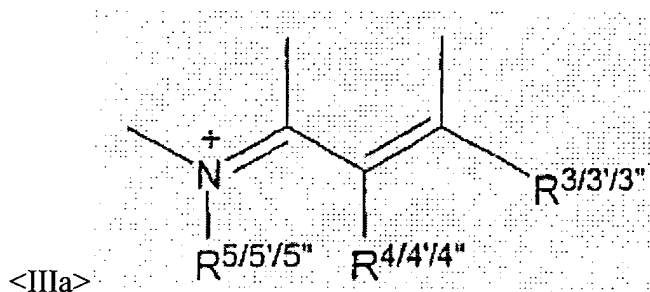


(A)

(A)

(A)

as well as further oligomeric phenazinium compounds, wherein, in the aforementioned general chemical formulae < I > and < II >, the structure unit  $N(R^{5/5'/5''})CC(R^{4/4'/4''})C(R^{3/3'/3''})$  has one of the general chemical formulae < IIIa > or < IIIb > :



wherein further

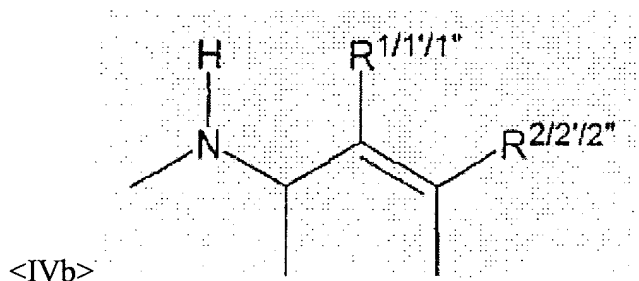
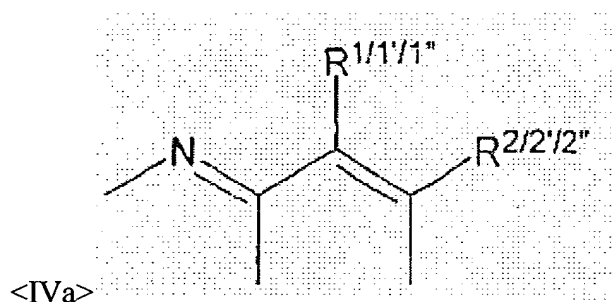
$R^1, R^2, R^3, R^4, R^6, R^7, R^8, R^9, R^{1'}, R^{2'}, R^{3'}, R^{4'}, R^{6'}, R^{7'}, R^{8'}, R^{9'}, R^{1''}, R^{2''}, R^{3''}, R^{4''}, R^{6''}, R^{7''}, R^{8''}$  and  $R^{9''}$  have each independently one of the meanings selected from the group consisting of

hydrogen, halogen, amino, OH, CN, SCN, SH, COOH, COO salt, COO ester,  $SO_3H$ ,  $SO_3$  salt,  $SO_3$  ester, lower alkyl, aryl and heteroaryl as well as a single bond that links the individual monomeric units together,

$R^5, R^{5'}, R^{5''}$  denote each independently the same as  $R^1, R^2, R^3, R^4, R^6, R^7, R^8, R^9, R^{1'}, R^{2'}, R^{3'}, R^{4'}, R^{6'}, R^{7'}, R^{8'}, R^{9'}, R^{1''}, R^{2''}, R^{3''}, R^{4''}, R^{6''}, R^{7''}, R^{8''}$  and  $R^{9''}$  with the proviso that they do not represent a single bond,

at least one of the residues selected from the group consisting of  $R^2, R^{2'}, R^{2''}, R^3, R^{3'}, R^{3''}, R^7, R^{7'}, R^{7''}, R^8, R^{8'}, R^{8''}$  has one of the meanings selected from the group consisting of halogen and hydroxyl.

$R^2, R^{2'}, R^{2''}, R^3, R^{3'},$  and  $R^{3''}$  may additionally be selected from the group consisting of oxo, imino and methylene with the proviso that a monmeric unit substituted by oxo, imino or methylene comprises the structure unit  $N(R^{5/5/5''})CC(R^{4/4/4''})C(R^{3/3/3''})$  of the general chemical formula < IIb >, wherein further, if  $R^2, R^{2'}, R^{2''}, R^3, R^{3'}$  and  $R^{3''}$  are not oxo, imino or methylene, the structure unit  $NCC(R^{1/1/1''})C(R^{2/2/2''})$  has one of the following general chemical formula < IVa > or < IVb >



wherein further  $A^-$  is an acid anion and

wherein further all of the oligomeric phenazinium compounds having the general chemical formulae < I > and < II > are contained in the mixture in an amount of at least about 80 mol-%.

Claim 2. (Canceled)

Claim 3. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 1, wherein at least one of the residues selected from the group consisting of  $R^2$ ,  $R^3$ ,  $R^{7''}$  and  $R^{8''}$  in the oligomeric phenazinium compounds according to the general chemical formula < II > has one of the meanings selected from the group consisting of halogen and hydroxy.

Claim 4. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 1, wherein at least one of the residues selected from the group consisting of  $R^2$ ,  $R^{2'}$  and  $R^{2''}$  represents lower alkyl.

Claim 5. (Original) The mixture of oligomeric phenazinium compounds according to claim 4, wherein lower alkyl is methyl or ethyl.

Claim 6. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 1, wherein at least one of the residues selected from the group consisting of  $R^7$ ,  $R^{7'}$ ,  $R^{7''}$  represents an alkylated amine.

Claim 7. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 6, wherein the alkylated amine is selected from the group consisting of N-methylamine, N-ethylamine, N, N-dimethylamine and N, N-diethylamine.

Claim 8. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 1, wherein at least one of the residues selected from the group consisting of  $R^5$ ,  $R^{5'}$  and  $R^{5''}$  represents methyl or an aryl group.

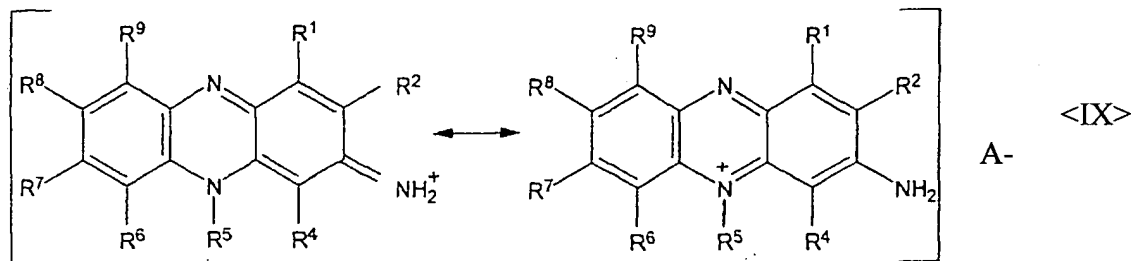
Claim 9. (Original) The mixture of oligomeric phenazinium compounds according to claim 8, wherein the aryl group is phenyl or tolyl.

Claim 10. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 1, wherein the acid anion  $A^-$  is selected from the group consisting of sulfate, hydrogen sulfate, halide, tetrafluoroborate, hexafluorophosphate, nitrate, acetate, trifluoroacetate and methanesulfonate.

Claim 11. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 1, wherein the monomeric units in the compounds are selected from the group consisting of

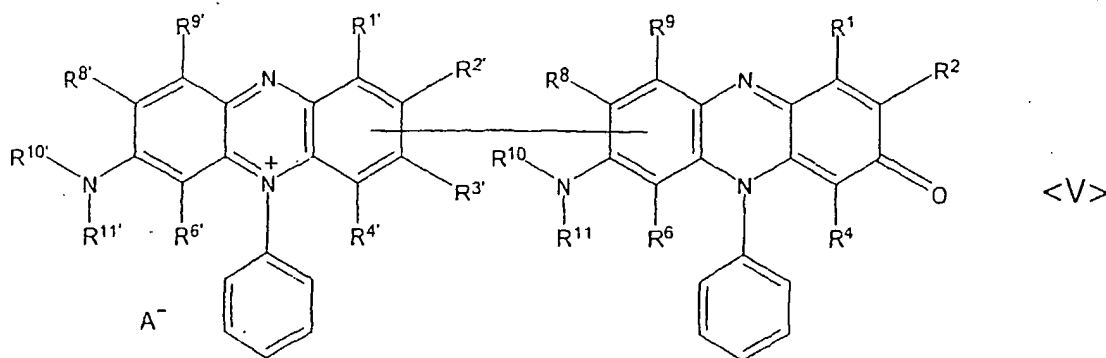
- a) 7-N, N-dimethylamino-3-hydroxy-2-methyl-5-phenyl- phenazinium
- b) 3-chlorine-7-N, N-dimethylamino-5-phenyl-phenazinium
- c) 8-dimethylamino-10-phenyl-10H-phenazine-2-one
- d) 2-N,N-dimethylamino-10-phenyl-5, 10-dihydrophenazine
- e) 3-N-ethylamino-7-hydroxy-5-phenyl-phenazinium
- f) 3-chlorine-7-N-ethylamino-5-phenyl-phenazinium
- g) 3-methyl-8-N-methylamino-10-phenyl-10H-phenazine-2-one
- h) 7-N-methylamino-2-methyl-5-phenyl-5, 10-dihydrophenazine

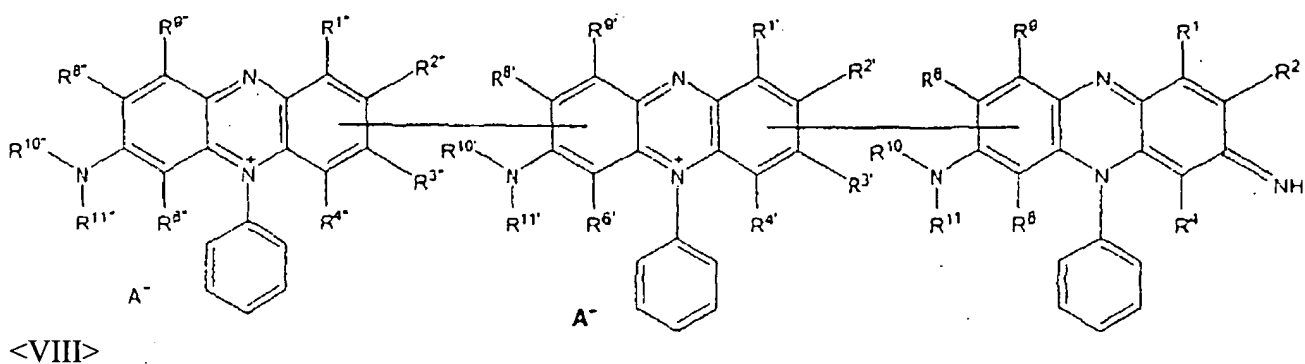
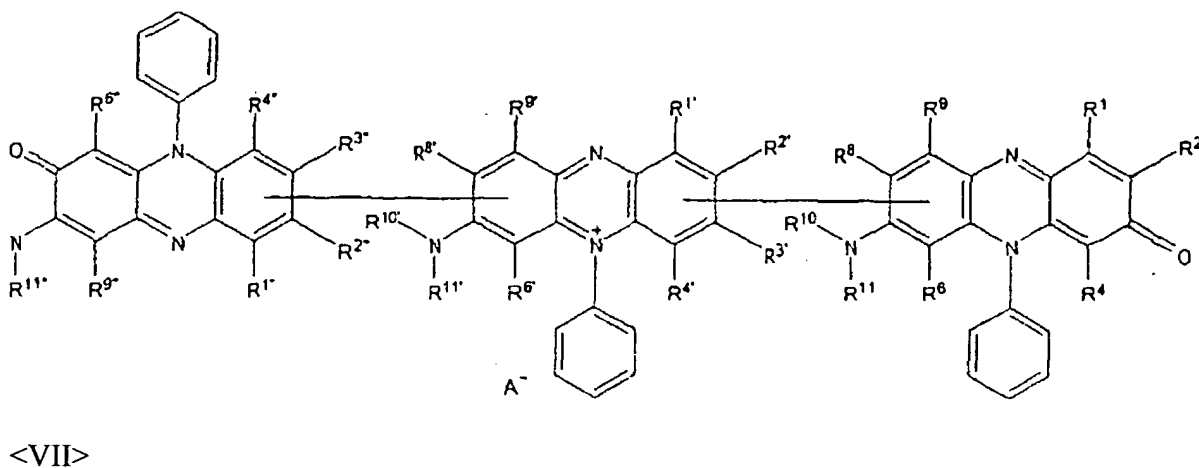
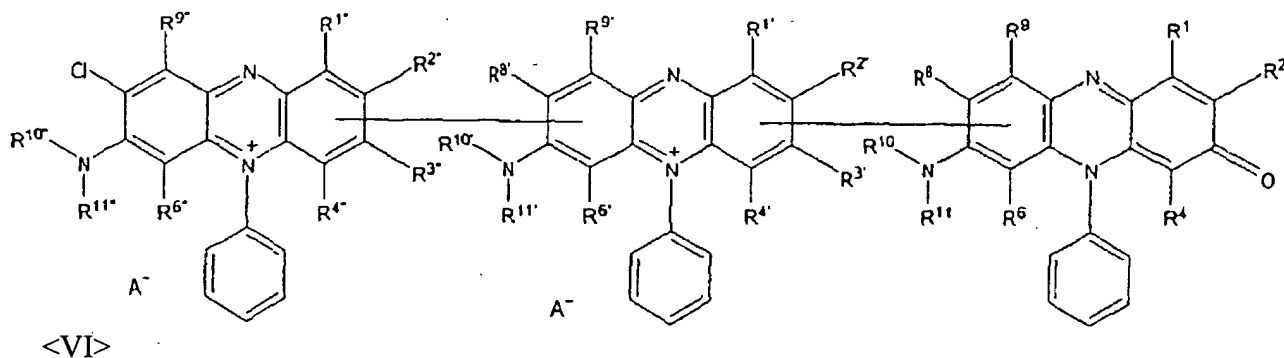
Claim 12. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 1, wherein the mixture is produced by diazotation of at least one monomeric phenazinium compound of the following general chemical formula < IX > :



wherein  $R^1, R^2, R^4, R^5, R^6, R^7, R^8$  and  $R^9$  have the same meanings as given before  
 and by reacting the resulting diazonium compounds in a one-pot reaction to form the oligomeric phenazinium compounds.

Claim 13. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 1, wherein the compounds have chemical formulae selected from the group consisting of:





wherein  $R^1, R^2, R^4, R^6, R^8, R^9, R^{1'}, R^{2'}, R^{3'}, R^{4'}, R^{6'}, R^{8'}, R^{9'}, R^{1''}, R^{2''}, R^{3''}, R^{4''}, R^{6''}, R^{8''}$  and  $R^{9''}$  have the above mentioned meanings and wherein  $R^{10}, R^{11}, R^{10'}, R^{11'}, R^{10''}$  and  $R^{11''}$  represent

hydrogen or lower alkyl.

Claim 14. (Currently amended) The mixture of oligomeric phenazinium compounds according to claim 1, wherein they are selected from the group comprising:

- i. 3'-N,N-dimethylamino-3, 8'-dimethyl-8- (N-methylamino)-7'-oxo-10,5'-diphenyl-5',7'-dihydro-[2, 2'] biphenaziny-10-ium-chloride
- ii. 3,8',8"-trimethyl-8, 3',3"-tris- (N-methylamino)-7"-oxo-10, 5', 5"-triphenyl-5', 10', 5",7"-tetrahydro- [2, 2' ; 7', 2"] terphenazine-10-ium-chloride
- iii. 8,3'-bis-(N,N-dimethylamino)-8'-methyl-7'-oxo-10,5'-diphenyl-5',7'-dihydro-[2,2']biphenaziny-10-ium-hydrogen sulfate
- iv. 8,8'-bis-(N,N-dimethylamino)-3,3'-dimethyl-10,10'-diphenyl-[2,2'] biphenaziny-10,10'-ium-tetrafluoroborate
- v. 8,8'-bis-(N,N-dimethylamino)-10,10'-diphenyl-3-methyl-[2,2']biphenaziny-10,10'-ium-tetrafluoroborate
- vi. 3,8'-bis-(N,N-dimethylamino)-8,3'-dimethyl-5,10'-diphenyl-7-hydroxy-[2,2']biphenaziny-5,10'-ium-tetrafluoroborate
- vii. 3,8'-bis-(N,N-dimethylamino)-8,3'-dimethyl-5,10'-diphenyl-7-hydroxy-[2,2']biphenaziny-5,10'-ium-chloride
- viii. 3,8',8"-tris-(N,N-dimethylamino)-8-methyl-5,10',10"-triphenyl-[2,2';7',2"]terphenazine-5,10',10"-ium-tetrafluoroborate
- ix. 8'-N,N-diethylamino-8-N,N-dimethylamino-3-methyl-10,10'-diphenyl-[2,2']biphenaziny-10,10'-ium-sulfate



- x. 8'-N,N-diethylamino-3-N,N-dimethylamino-7-hydroxy-8-methyl-5,10'-diphenyl-[2,2']biphenaziny-6,10'-ium-sulfate
- xi. 8,3',3''-tris-(N,N-dimethylamino)-7''-oxo-10,5',5''-triphenyl-5',10',5'',7''-tetrahydro-[2,2';7',2'']terphenazine-10-ium-hydrogen sulfate
- xii. 3,8'-bis-(N,N-diethylamino)-7-hydroxy-5,10'-diphenyl-[2,2']biphenaziny-6,10'-ium-sulfate
- xiii. 7-chlorine-3,8'-bis-(N,N-dimethylamino)-5,10'-diphenyl-8-methyl-[2,2']biphenaziny-5,10'-ium-chloride
- xiv. 7-chlorine-3, 8'-bis-(N,N-dimethylamino)-8,3'-dimethyl-5,10'-diphenyl- [2, 2']biphenaziny-5,10'-ium-chloride
- xv. 7-chlorine-3,8'-bis-(N,N-dimethylamino)-5,10'-diphenyl- [2,2']biphenaziny-5, 10'-ium-chloride
- xvi. 7-chlorine-3, 8',8''-tris- (N, N-dimethylamino)-8, 3'-dimethyl-5, 10', 10''-triphenyl-[2, 2' ; 7', 2''] terphenaziny-5,10',10''-ium-chloride
- xvii. 7-chlorine-8,1'-dimethyl-8'-N,N-dimethylamino-5,10'-diphenyl-[2,2']biphenaziny-5,10'-ium-chloride
- xviii. 8,8'-bis-(N,N-dimethylamino)-10,10'-dimethyl-[2,2']biphenaziny-10,10'-ium-hydrogen sulfate
- xix. 8,3',3''-tris-(N,N-dimethylamino)-7''-oxo-10,5',5''-triphenyl-5'',7''-dihydro-[2,2';7',2'']terphenazine-10,5'-ium-hydrogen sulfate

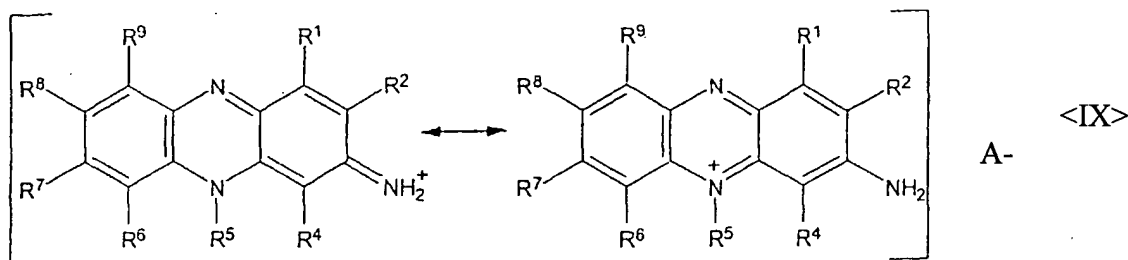
xx. 8,3',3''-tris-(N,N-dimethylamino)-8-methyl-5,10',10''-triphenyl-[2,2';7',2'']terphenazine-5,10',10''-ium-tetrafluoroborate

xxi. 8,8'-bis(N,N-dimethylamino)-10,10'-diphenyl-[2,2']biphenaziny-10,10'-ium-tetrafluoroborate

xxii. 8,8'-bis-(N-methylamino)-3-chlorine-10,10'-diphenyl-[2,2']biphenaziny-10,10'-ium-chloride

xxiii. 3,3',3''-tris-(N-methylamino)-8''-chlorine-5,5',5''-triphenyl-[8,2';8,7'']terphenazine-5,5',5''-ium-chloride.

Claim 15. (Previously presented) A method of preparing the mixture of oligomeric phenzinium compounds according to claim 1, wherein at least one monmeric phenazinium compound of the following general chemical formula <IX>:



wherein  $R^1, R^2, R^4, R^5, R^6, R^7, R^8$  and  $R^9$  have the same meanings as given before,  
is diazoted and the diazonium compounds formed in the diazotation reaction are reacted to the mixture of oligomeric phenazinium compounds in a one-pot reaction.

Claim 16. (Previously presented) The method according to claim 15, wherein the monomeric phenazinium compounds of the general chemical formula <IX> are selected from the group consisting of safranine dyestuffs in which  $R^1, R^4, R^6$  and  $R^9$  each represent hydrogen,  $R^5$

represents phenyl and  $R^7$  represents  $NR^{10}R^{11}$ , wherein  $R^{10}$  and  $R^{11}$  each independently have one of the aforementioned meanings.

Claim 17. (Previously presented) The method according to claim 15, wherein

a) the safranine or the mixture of safranines is suspended in mineral acid and

b) a nitrite ornitrosyl sulfuric acid is added to the suspension of the safranine or the mixture of safranines in the mineral acid at a temperature of at least 15 °C.

Claim 18. (Previously presented) The method according to claim 17, wherein the mineral acid is selected from the group consisting of hydrochloric acid, sulfuric acid, tetrafluoroboric acid, hexafluorophosphoric acid, phosphoric acid, hydrobromic acid and the mixtures thereof.

Claim 19. (Previously presented) The method according to claim 15, wherein the resulting diazonium compounds are reacted to form the mixture of oligomeric phenazinium compounds in the presence of a catalyst made of metal, selected from the group consisting of copper, nickel, palladium and iron or of compounds of these metals, or of compounds selected from the group consisting of alkali xanthogenates, alkali thiocyanates and alkali selenocyanates.

Claim 20. (Previously presented) The method according to claim 19, wherein the metal compounds are selected from the group consisting of oxides, halides and pseudohalides of the metals.

Claim 21. (Previously presented) The method according to claim 19, wherein the catalyst is in the form of a powder.

Claim 22. (Previously presented) An acidic bath for electrolytically depositing a copper deposit, said acidic bath containing oligomeric phenazinium compounds, wherein the oligomeric

phenazinium compounds are contained in the form of the mixture according to claim 1.

Claim 23. (Original) The acidic bath according to claim 22, wherein the mixture of the oligomeric phenazinium compounds is contained in a concentration of 0.00005-0.1g/l.

Claim 24. (Previously presented) The acidic bath according to claim 22, wherein it additionally contains compounds selected from the group consisting of nitrogen containing sulfur compounds and polymeric nitrogen compounds.

Claim 25. (Original) The acidic bath according to claim 24, wherein the concentration of the nitrogen containing sulfur compounds and the polymeric nitrogen compounds contained together in the bath is 0.0001-0.50g/l.

Claim 26. (Previously presented) A method of electrolytically depositing a copper deposit by which a workpiece and an anode are contacted with a bath containing copper ions and the mixture according to claim 1, and a flow of electric current is generated between the workpiece and the anode.

Claim 27. (Previously presented) The method according to claim 26 including the step of producing decorative surfaces by depositing a highly bright, leveled copper deposit.

Claim 28. (Previously presented) The method according to claim 26 including forming a copper deposit on printed circuit boards provided with blind microvias.

Claim 29. (Previously presented) The method according to claim 26 including forming a copper deposit on semiconductor substrates provided with high aspect-ratio recesses.

Claim 30. (Previously presented) The mixture of oligomeric phenazinium compounds according to claim 2, wherein at least one of the residues selected from the group consisting of

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Response dated: March 3, 2009

$R^2$ ,  $R^3$ ,  $R^7$  and  $R^8$  in the oligomeric phenazinium compounds according to the general chemical formula < II > has one of the meanings selected from the group consisting of halogen and hydroxy.

Claim 31. (Previously presented) A printed circuit board provided with blind microvias on which board is formed a copper deposit in accordance with claim 1.